

PRUDDEN (T. Mitchell)

Extracted from the American Journal of the Medical Sciences for July, 1880.

INDEX
MEDICUS.

CONTRIBUTIONS TO THE STRUCTURE AND
CLINICAL HISTORY OF THE MULTIPLE NEUROMA,
FROM THE PATHOLOGICAL LABORATORY
OF THE ALUMNI ASSOCIATION
OF THE COLLEGE OF PHYSICIANS AND SURGEONS,
NEW YORK CITY.

BY

T. MITCHELL PRUDDEN, M. D. ✓

OF NEW YORK.



CONTRIBUTIONS TO THE STRUCTURE AND CLINICAL HISTORY OF THE
MULTIPLE NEUROMA, FROM THE PATHOLOGICAL LABORATORY
OF THE ALUMNI ASSOCIATION OF THE COLLEGE OF
PHYSICIANS AND SURGEONS, NEW YORK CITY.

By T. MITCHELL PRUDDEN, M.D.,
OF NEW YORK.



THE tumours of the nerves are either single or multiple, and when multiple, may either be confined to a single nerve trunk, or be found in nearly all the spinal and cranial nerves, in the brain and spinal cord, and in the sympathetic. It is convenient to apply the general term, multiple neuroma, to those cases in which a greater or less number of tumours exist on more than one of the main nerve trunks or their branches.

Although somewhat artificial, this classification is convenient as expressing, in a general way at least, the distinction which seems to exist between what appears to be a local, and a more or less general lesion. The recorded cases of multiple neuroma are so few, their clinical history so obscure, and the anatomical lesion in many cases so marked and extensive, and present features of such surpassing interest alike to the physiologist, the pathologist, and the practitioner, that a description of every case in which the clinical history is known or new anatomical facts are elicited, seems in the highest degree desirable.

The purpose of this article is to record a new case of this rare disease, and to give a brief summary of the cases hitherto described.

For the following clinical history of the new case, the writer is indebted to the courtesy of Dr. Herbert W. Little, Resident Physician to the Presbyterian Hospital, New York City.

CASE I.—Maria D., female, age 25, single; lady's maid; Canada. Admitted to hospital Oct. 14, 1879. Family history negative. The uterine and associated functions have been normally performed; no venereal history. Seven years ago she had an attack of smallpox which lasted two months, and while convalescing she became partially paralyzed in both lower extremities, losing sensation in both feet. The knees could be

flexed with difficulty, and the thighs partly drawn up. Very little movement possible of the foot upon the leg. The upper extremities were unaffected, the arms and fingers being used for somewhat delicate manipulations, such as sewing and writing. She took strychnia for some time without benefit. Two months ago the use of electricity was commenced, and under it both feet recovered sensation, and the right leg recovered its power to a certain extent.

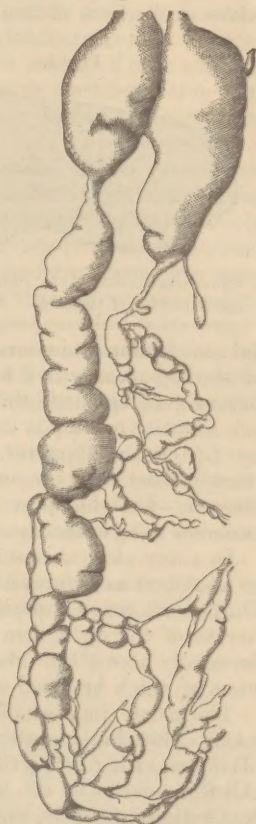
Before the use of electricity she had no pain, but since then she has experienced pain, sometimes quite intense and of increasing severity along the course of the sciatic nerves. On admission, patient was fairly well nourished, but presented a marked anæmic, even cachectic appearance. Motion in legs comparatively limited. The higher senses are intact, and she possesses average intelligence. General cutaneous sensibility normal except in the right foot. Numerous tumours were found in different parts of the body, especially in the right iliac region, axillæ, and neck, which were not painful on pressure, and had been first noticed during her convalescence from smallpox, since which time they had gradually enlarged, but had given her no inconvenience and attracted little attention. Under tonics and the continuous current she improved somewhat, but was still harassed, especially at night, by dull aching, or sometimes darting pains, along the course of both sciatics. There were no abnormalities in respiration or cardiac action, nor had she ever experienced any convulsive movements. Examination of the blood revealed considerable increase in the relative number of the white blood cells. On Nov. 1st, when apparently doing well, she was suddenly attacked with nausea and vomiting, then with diarrhœa, and died in four days.

The usual brain and visceral examination was made on the day following death, and the subject finally found its way into the anatomical department of the College of Physicians, where further dissections were made. The writer wishes here to express his indebtedness to Dr. N. P. Warner for a report of the condition of the cranial nerves, and to Drs. T. E. Satterthwaite, Pathologist, and W. H. Porter, Curator, to the Presbyterian Hospital, for a report of the autopsy and for some of the abdominal tumours.

Autopsy, forty hours after death. Rigor mortis pronounced; panniculus adiposus abundant; subcutaneous tissue slightly œdematous. A large tumour in the right iliac fossa was felt through the abdominal walls, and series of larger and smaller tumours or masses of tumours were distinctly to be felt on both sides of the neck, in the axillæ, and extending down the arms, and along the course of both sciatics down to the popliteal spaces. The heart presented no marked change. The lungs were slightly œdematous, and presented slight abnormalities in the form and number of the lobes. On the removal of the heart and lungs, a series of small whitish tumours was seen scattered at short intervals along either side of the spinal column; along the intercostal spaces the pleura was bulged out toward the thoracic cavity at irregular intervals, by numerous larger and smaller tumours lying between the ribs. The large tumour in the right iliac fossa, which weighed about two kilos, was embedded in, and attached to, the branches of the lumbar and sacral plexuses, and consisted of a congeries of larger and smaller tumours varying in size from a small pea to a goose egg, and the whole so firmly attached to the periosteum of the ilium that a portion of its superficial layers came off with the tumour on its removal.

Within the mass of tumours a cyst was found containing about 150 c. c. of transparent straw-colored fluid. The whole mesentery was studded with small white tumours resembling enlarged lymphatic glands. On the anterior surface of the stomach was a white, sub-peritoneal tumour, about as large as a walnut. The stomach, intestines, liver, bladder, and generative organs presented no abnormalities. The kidneys were both deeply congested, and the capsule at some points slightly adherent. Microscopical examination showed a slight degree of parenchymatous inflammation. The brain and meninges were deeply congested, but otherwise presented nothing abnormal. The spinal cord was not examined at the autopsy, but the canal was opened later, and although the post-mortem changes were then too great to permit the formation of any opinion as to the ante-mortem condition of the cord itself, no tumours were found either upon the membranes or on the roots of the spinal nerves. The cauda equina was, unfortunately, not examined. One optic nerve presented a small fusiform enlargement just before piercing the sclerotic and numerous tumours of the same character were found on the supra- and infra-orbital, buccal, supra-maxillary, gustatory, and hypoglossal nerves, and also on the occipital, spinal accessory, and upper portion of the phrenics. Of all the cranial nerves, the lesion was most marked in the pneumogastrics, especially the right. The left pneumogastric in the cervical region was enlarged throughout and presented a series of distinct tumours; its average diameter being about 1 cm. The right pneumogastric (see Fig. 1) presented, near the point where the superior laryngeal is given off, a tumour 3.6 cm. in diameter and 6 cm. long. Between this point and the bifurcation of the trachea a series of tumours averaging about 2 cms. in diameter and 3 cm. in length, were closely set along the nerve, which was itself at no point less than 4 mm. in diameter. Below the tracheal bifurcation, the nerve assumed nearly its normal dimensions, but was for the most part involved, as were its oesophageal branches, in a series of fusiform tumours varying from 8 to 30 mm. in length and 4 to 16 mm. in thickness. The sympathetic of the right side was also the seat of excessive changes. (Fig. 1.) In the place of the superior cervical ganglion an oblong tumour was found 9 by 3.2 cm. In the deep cardiac plexus all the nerves were enlarged, as were the branches coming from the pneumogastric, and were thickly beset with irregular-shaped tumours from the size of a pin's head to that of a small Lima bean. The nerves of the extremities, which were fully examined only in the left leg and right arm, were thickened throughout almost their entire extent, and were the seat of the most extensive tumour formation. In the hand and foot alone the lesion was slight.

Fig. 1.



One-third the natural size.

The tumours varied from the size of a pin's head to that of a hen's egg. The changes were more extensive in the lower than in the upper half of the body. Both sciatics, at their exit from the pelvis, presented themselves in the form of immense irregularly knobbed cords, the left, measur-

Fig. 2.



A transverse section of the right sciatic in the upper portion of the thigh. Natural size.

ing at its upper portion 6 by 3 cm. in diameter, and diminishing but little in size down to the popliteal region. The right sciatic was somewhat larger. (Fig. 2.) At their upper portions, the external and internal popliteals were of nearly equal size, and measured about 4.5 by 3 cm. in diameter. All the nerves of the leg, both muscular and cutaneous, were thickened, and presented numerous ovoidal and fusiform tumours of varying size; the posterior tibial in the middle of the leg measured 2 by 1 cm. in diameter. Below the ankle-joint the nerves were but little thickened, and presented no distinct tumours. The left anterior crural, as it passed beneath Poupart's ligament, measured 3 by 1.5 cm. in diameter, and its muscular and cutaneous branches were thickly beset with tumours from the size of a millet seed to that of a large almond. On the main trunk of this nerve and its branches 276 distinct tumours were counted.

In many places, especially in the thighs, the subcutaneous tumours were so abundant as to form a dense mat, almost concealing the muscles beneath. On the left cervical plexus was a tumour as large as a hen's egg. All the nerves of the right arm as far down as the wrist were greatly changed, especially above the elbow. The right brachial plexus was formed of a mass of thick knobbed cords.

The whole number of distinct tumours counted in the right arm was 142. The whole number of tumours counted in the entire body, exclusive of the right leg below the middle of the thigh and the left arm, was 1182. All the muscles of the left leg between the knee and ankle were more or less yellow in colour, and this was most marked in those on the posterior aspect of the limb, where the gastrocnemius and soleus, although presenting their normal size and shape, were entirely converted into fat tissue. The right leg unfortunately was not examined.

In some cases the tumours present themselves in the form of more or less symmetrical usually fusiform enlargements of the nerve. In other cases a portion of the nerve is seen passing, without enlargement, over the surface of the tumour to which it is often closely bound by connective tissue. The tumours are all inclosed in a distinct capsule, sometimes loose and thin, sometimes dense and thick, which, in many cases, seems to be a direct continuation of the lamellar sheath and perifascicular connective tissue.¹ In some cases they are arranged along the nerves at irregular intervals like beads upon a string, in others they are crowded closely together, giving the nerve the appearance of a cylinder with more or less

¹ To avoid misconceptions, the writer would state here that in the following anatomical descriptions of the nerves he uses the nomenclature employed and in part suggested by Ranvier in his *Lçons sur l'Histologie du Système Nerveux*, vol. i. p. 179 et seq.

well-defined constrictions at irregular intervals. In the larger and more complex nerve trunks, such as the sciatics, the entire cord is surrounded by a distinct sheath, within which are contained congeries of tumours attached to the different groups of nerves, each in turn being inclosed by distinct connective tissue membranes of varying thickness which serve as partitions between the different tumours and nerve cords. These tumours are intimately joined by oblique and transverse nerve fascicles which running from one to another weave the whole together into a tolerably compact mass.

In no case was a tumour found to which, by careful dissection, a nerve fibre could not be found joined. Not less varied is the consistency of the different tumours, and the appearances which they present macroscopically on section. The great majority of the smaller and medium-sized tumours are soft and distinctly gelatinous, but all intermediate forms are seen between these and those which possess the consistency and general characters of the fibromata. The softer gelatinous tumours are either transparent, grayish, and crossed here and there by bands of more consistent tissue; or, in many cases they are of a pale or deep red colour and exude on pressure a transparent, or turbid, or reddish fluid. Occasionally very thick walled bloodvessels may be seen upon the cut surfaces.

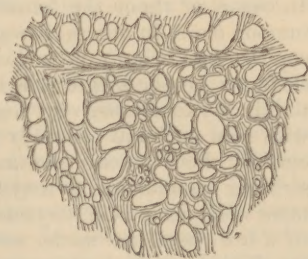
The microscopical examination showed that in those parts in which the lesion presented itself in the simplest form, that is, in the simply hypertrophied nerves, the change consists essentially in a diffuse sclerosis of the intra-fascicular connective tissue, the new formed tissue being for the most part dense and firm and furnished with few cells.

This thickened intra-fascicular connective tissue is more firmly joined to the neurilemma of the nerve fibres than it is under normal conditions, so that by carefully brushing thin sections of the nerves under water, the medullary sheaths and axis cylinders may be entirely removed leaving a more or less dense consistent reticulum behind. (Fig. 3.)

In those cases in which the nerves present small but more or less distinctly circumscribed enlargements, the above described diffuse sclerosis exists either in the entire, or, which is more commonly the case, in circumscribed portions of the nerve; but in addition to this, there is in many cases, a more or less uniform involvement of a part or all of the inner layers of the lamellar sheath. This change in the lamellar sheath may consist in a growth inward from it into the nerve, of broad or narrow branching fascicles of connective tissue dividing the latter into irregular areas or chambers: or, what is frequently the case, the inner layers of the sheath at one or other side of the nerve or in its entire circumference become either simply thickened, or spread apart by an accumulation of cells of various sizes and shapes or by new formed connective tissue, so as to occupy a considerable portion of the diameter of the enlarged nerve and to form the greater part of the tissue constituting the tumour proper.

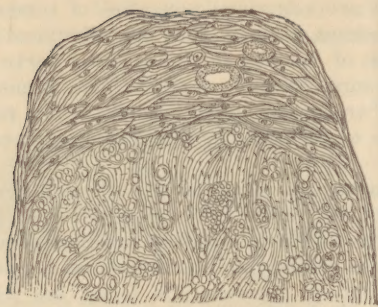
In many cases, the lamellar sheath thus altered (see Fig. 4) is sharply outlined against the sclerosed nerve within, in others it passes without

Fig. 3.



Portion of such a pencilled section.

Fig. 4.



Part of a transverse section of such a small fusiform tumour, near the middle of which some of the nerve fibres are much compromised by the diffuse sclerosis. For the sake of clearness the medullary sheaths and axis cylinders have, except in one place, been left out of the drawing.

preserved their normal diameters, and in some cases, particularly when the new formed tissue was soft and presented the characters of mucous tissue, many fibres were found which were considerably thicker than any found in the nerves leading to the tumour; a circumstance which seems to be of no little significance in view of the surprising absence of definite symptoms which is often seen in these cases of multiple neuroma.

The larger tumours presented for the most part the structure of the fibromata or the myxomata, or more frequently a combination of the two. In some of them the lamellar sheath was intimately involved in the tumour mass, in others it was simply stretched around it. With one exception (see below), no evidence was found of any increase in the nerve elements proper within the tumours. In those tumours, which were distinctly myxomatous, very numerous narrow fibres, singly or in clusters, with oval nuclei at tolerably regular intervals along their sides, were seen curling about among the medullated nerve fibres and presented a very striking resemblance to amyelinic nerve fibres. The fact that after treatment with picric acid they could be broken up into delicate fibrillæ, and that in a few cases the nuclei were seen to be surrounded by extremely thin but distinct ovoidal or irregular-shaped cell bodies, convinced the writer that they were in reality however nothing else than fibrillar connective tissue of a peculiar form.

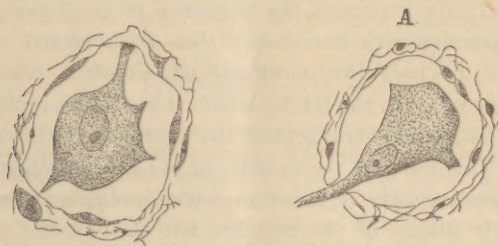
In one tumour, and in only one, a considerable number of ganglion cells was found. This tumour was formed upon one of the branches of the lumbar plexus, and was about 1 cm. in diameter and 1.5 cm. in length; it was symmetrical in shape, and the nerve entered it at either end. In a series of more than 50 sections from this tumour and the nerve on which it was formed, and in a large number of teased preparations of the same, except in the immediate vicinity of the ganglion cells, no amyelinic nerve fibres were found. These cells were all confined to a limited zone of the tumour about 2 mm. in thickness, and presented the usual diversity of form. The body was granular, the nucleus large and well defined, and usually contained one or more distinct nucleoli, and many of the cells contained larger and smaller masses of yellow or orange pigment. Each

sharp demarcation into the tissue of the latter. In those cases in which a separation of the layers of the sheath occurs, the individual layers often retain their endothelial covering, as may be readily seen in transverse sections.

No attempt was made by counting, to determine whether the number of nerve fibres in the tumours was actually increased, but a series of measurements of a great number of fibres in the nerves leading to the tumours, and in the tumours themselves, showed that in a small proportion of cases only, the average diameter of the nerve fibres was diminished, while in the great majority of cases they

cell lay in a well-defined capsule, lined with flattened polygonal cells. The smaller ones had a diameter of .019 mm., the larger of .06 mm. The average diameter of all, taken from a large number of measurements, was .037 mm. According to Key and Retzius¹ the diameter of normal human sympathetic ganglion cells, ranges from .011 to .05 mm., the average being .025. (Fig. 5.)

Fig. 5.



Representation of two of these cells surrounded by their capsules; in A. a cell process is seen extending into the adjacent tissue.

The occurrence of ganglion cells in the multiple neuromata seems to be extremely rare; only two cases,² so far as the writer has been able to ascertain, having been recorded; and in one of these, the description of the cells was not so exact as to inspire much confidence in their identification. The occurrence of such cells would of course suggest the possibility of a connection of the tumour or its nerve with the sympathetic. But a most searching examination of the nerve and tumour above and below the point at which the cells were found, failed, as above stated, to give any evidence whatever that such was the case.

Finally, in regard to the nerve fibres in the tumours; in a few cases, especially in the dense fibroma, their diameter is diminished, as determined by measurement of the fibres in the tumour and in the nerves on which they are formed. In the majority of cases, however, the diameter is unchanged, except that sometimes a few fibres are seen here and there in the distinctly myxomatous tumours whose diameters considerably exceed those of any fibres in the corresponding nerve. It does not seem desirable to give the details of these measurements here; suffice it to say that the diameter of the fibres, as determined by several hundred measurements, ranged from .0024 to .0168 mm., while in some cases, within the tumours a few attained a diameter of .0216 mm. The nerve fibres pass through the tumours either in larger and smaller bundles, or run singly, being separated from one another by the new formed tissue. They pass for the most part, as determined by sections, parallel with the axis of the nerve, in straight lines or in broad sweeps; but in a few cases, they were found to pursue a most tortuous course, forming here and there large tangled knots in which the fibres run in all directions, twisting around one another and intertwining in the most irregular and intricate manner.

¹ Key and Retzius, Studien. Heft II., p. 136.

² Knoblauch, De Neuromate et gangliis veris, etc., 1843, p. 30. Czerny, Archiv für klin. Chirurgie, Bd. xvii. p. 357.

In many of the tumours the walls of the smaller arteries were greatly thickened, mainly by increase of tissue in the adventitial layers, and in a considerable proportion of the softer tumours the capillaries were excessively dilated, and in some cases distinctly pouched.

The microscopical examination of the above-mentioned fatty muscles of the leg showed the most exquisitely marked characters of progressive muscular atrophy, or, to use the nomenclature suggested by Friedreich, which more exactly expresses the character of the lesion, *Polymyositis chronica progressiva* with *accessory diffuse lipomatosis*. In the gastrocnemius where the lesion was most marked, almost no trace whatever of muscular tissue was left, the fat by which it had been replaced not even suggesting in its general arrangement the nature of the tissue whose place it occupied. This lesion of the muscles in our case is interesting not only as being the first case yet recorded in which multiple neuroma was complicated by this disease of the muscles, but also, on the other hand, as adding another to the diseases of the nerves which may possibly stand in etiological relations to this form of muscular disease.

In three of the cases analyzed below, "fatty degeneration" of certain groups of muscles was indeed recorded, but without a sufficiently detailed description to enable us to classify them definitely with the case in hand.¹

If we limit the term, multiple neuroma, to those cases in which several nerve tumours are found on more than one main trunk or its branches, there are, so far as the writer has been able to discover, only forty cases yet recorded, exclusive of the one above described.

Although the extent of the lesion varies greatly in the different cases, the morphological characters are essentially the same in most of them, so far as the recorded descriptions permit us to decide. It seems to consist essentially in an increase in the connective tissue elements of both sympathetic and cerebro-spinal nerves, either in the form of a diffuse or circumscribed growth, giving now a simple thickening of the nerves, and again larger or smaller circumscribed tumours involving either the whole or only a part of the nerve. The nerve elements proper may or may not be involved, and when they are, the observed changes seem in most cases to be secondary to the connective tissue's new formation. In a few cases, however, it would seem that a not inconsiderable portion of the tumours consist of new-formed amyelinic nerve fibres. These tumours are liable to have from the outset or to assume myxomatous or sarcomatous characters, and in the latter case the possibility arises of their becoming malignant by metastasis. Tumours, although of a less well-defined structure, may also occur in the brain. When, however, we consider the symptoms which these tolerably well-defined changes produce, we find a diversity so extreme

¹ The preparations of most of the above described tumours and nerves are deposited in the museum of the College of Physicians and Surgeons, New York City. Certain of these with an abstract of the case were presented before the Pathological Society of New York, at its session of Jan. 28, 1880, by Dr. T. E. Satterthwaite.

that, when we remember the small number of cases yet known, it is no wonder that in the great majority of them the true nature of the disease was first revealed after the subject had been brought upon the dissecting table.

CASES II. and III.—The earliest recorded cases of this form of multiple neuroma are those of Monteggia¹ and Descot,² in which the entire nervous system presented numerous tumours, but of which no clinical history is preserved.

CASE IV.—In 1818, Schiffner³ described the case of Florian S., aged 34, a cretin, small in stature, and never able to use intelligible language. Up to seven years of age he was unable to walk. At this time, without apparent cause, he was attacked with violent convulsions, which continued with little intermission for three days, after which by slow degrees he recovered and became able to walk, but with an unsteady gait. He was weak and puny, unsociable, and passionate; slept much of the time, and when roused to eat gorged himself to such a degree that vomiting frequently ensued. The most trivial excitement induced convulsions. When thirty-four years of age, in a fit of anger, he was seized with apoplexy, which terminated fatally in a few days. The brain was normal; the cerebral nerves, with the exception of the optic and fifth, were softened. Tumours were found on the eighth pair and on the pharyngeal and laryngeal nerves, which were also enlarged. The cardiac and œsophageal plexuses were enlarged, and presented numerous tumours, some of them as large as a filbert. The nerves of the cervical and tracheal plexuses were similarly affected from their origin in the cord outward. Numerous tumours were found in the nerves of the upper and lower extremities. The nerves of the sympathetic were unaffected.

CASE V.—In 1822, Schiffner⁴ published his second case.

E. S., a younger brother of the former case, and likewise a cretin, died at 33, having been for a long time previously paralyzed in the lower extremities. No lesion of the brain or cord was noted. Numerous small tumours were found on various branches of the fifth nerve, on the facial filaments of the portio dura of the seventh, on the glosso-pharyngeal and pneumogastrics. In the cervical region the branches which the latter nerve sends to the larynx, as well as those by which it communicates with the sympathetic, were considerably enlarged, while in the chest numerous tumours were found on the œsophageal and pulmonary plexuses. Tumours were also found on the occipital, spinal accessory, and cervical nerves, and on those of both the upper and lower extremities. The right superior cervical ganglion was as large as a medium-sized filbert, as was also the inferior ganglion upon the left side.

CASE VI.—In October, 1817,⁵ a plasterer, thirty-nine years of age, unmarried, of fair muscular development, entered the hospital in Würzburg, having over the entire surface of the body down to the knees numerous painless movable tumours from the size of a hazel-nut to six or eight inches in diameter. These were congenital, and his father had suffered from the same evil.

Up to the summer of 1817, he had been in ordinarily good health. He now began to suffer from attacks of severe headache, which at first were not of long duration. They gradually increased in intensity and came periodically, mostly at night. They were preceded by a cold feeling along the spine, and followed by fever and sweating. During and aside from these attacks he suffered from nausea and bilious vomiting, and while they continued he was often very restless; the pupils were dilated, and sometimes double vision and strabismus occurred. The attacks continued to occur, greatly exhausting him, and he now became extremely weak and began to have pain in the knees and legs. A few days before his death

¹ Monteggia, *Institutione chirurgische*, 1813, vol. ii. p. 195: quoted by Wood in *Edinburgh Med. Chir. Trans.*, vol. iii. p. 345.

² Descot, *Dissertation sur les affections locales des nerfs*, Paris, 1822.

³ Schiffner, *Med. Jahrb. des Oestreich. Staats*, Bd. IV. St. 4, p. 77.

⁴ *Ibid.*, Bd. VI. St. 4, p. 44.

⁵ Heller, *Virchow's Archiv*, Bd. 44, p. 338. (This case is known as Hesselbach's case.)

he complained of numbness in the limbs which occurred periodically and interfered with movement. The headache diminished, but pain in the legs and loins increased, as did also his general weakness. He died quietly December 5, 1817.

The entire left half of the cerebellum was crowded back by the greatly swollen *crus cerebelli*; the right half of the cerebellum was regularly formed but crowded aside. The pons Varolii merged into the medulla and *crura cerebri*. No marked alteration in the cerebrum except a slight increase in the amount of ventricular fluids. The spinal cord and its membranes were normal except that several little fat? tumours were found within the canal. All the cerebro-spinal nerves were three or four times as thick as usual, and the smaller branches were beset with numerous tumours. The nerves of both upper and lower extremities, as soon as they emerged from the intervertebral foramina, presented themselves in the form of enormously swollen cords beset with tumours of varying size. The great sciatics at the upper portions were one and a-half inches in diameter. Some of the sympathetic ganglia were as large as a hazel-nut.

CASE VII.—Barkow¹ relates the case of Johann W., 30, cattle driver, narrow-breasted, and of weak intellect. He had suffered, so far as could be judged from his unsatisfactory account of himself, from successive attacks of pleurisy. Two years before his admission to hospital in 1822, he noticed a small painless swelling in the right calf. During the summer of 1821 it grew rapidly larger and interfered with walking, and finally the leg in its largest part attained a circumference of over eighteen inches. The corresponding foot felt heavy and numb, but the tumour was painful on pressure only at one point on the inner side of the leg. He was now lost sight of for a time, but in January, 1824, he presented himself again with the tumour greatly increased in size, and in the last stages of consumption, and died on the following day. The large tumour of the calf at the time of death was three feet one inch in circumference, its surface was nodulated, and it contained several cysts. The lower portions of the sciatic and the upper portion of the peroneus and tibialis were enlarged. Both pneumogastrics and many of their branches were thickened and presented numerous small tumours. The pulmonic and œsophageal plexuses were studded with small tumours. The right phrenic was somewhat enlarged near the heart; the sympathetic was normal.

CASE VIII.—Another Würzburg case occurring in Schönlein's clinic is described by Hasler.²

Barbara H., 20, single, admitted September 20, 1828. A few weeks before admission she fell into cold water, and traces her illness to that exposure. She soon began to have spasmodic pains, numbness, and formication in the arms; weakness followed, then extreme anæsthesia and paralysis, so that without support she could neither walk nor sit; the fingers became permanently flexed, and the neck muscles became so paralyzed that she could not hold the head upright; emaciation excessive. Later she experienced pain in the upper extremities and about the body and in the præcordia, and she had attacks of difficult breathing and palpitation. A tumour was discovered under the right sterno-cleido-mastoid muscle which patient had not noticed before. A marked improvement was noticed under the use of strychnia. The attacks of palpitation and oppressed breathing soon recurred, however, and she experienced suffocative paroxysms similar to those noticed in animals after section of the pneumogastrics. The last of these she survived only two days, dying February 25, 1829. In the last days her appetite was poor, and she had diarrhœa.

Autopsy.—The tumour in the neck was formed by an enlargement of the superior cervical sympathetic ganglion, which measured three by two inches, was fibrous in texture, and had small nerves running over its surface. All the nerves joining the ganglion were notably enlarged, and presented several circumscribed tumours. The right pneumogastric was studded with small tumours, and several of considerable size were found within the spinal canal upon the roots of the cervical nerves.

CASE IX.—The next case, recounted by Knoblauch,³ occurred in Bischoff's service in the Insane Asylum at Heidelberg, in 1840.

¹ Barkow, *Bemerkungen über d. Nerven Anschwellungen*, 1829.

² Hasler, *De neuromate*—Turici, 1835.

³ Knoblauch, *De neuromate et gangliis accessoriis veris*, p. 27, Frankfort, 1843.

George A., an idiot from infancy, was slightly built, but of strong constitution and extremely indolent and passionate. He died at 38 years of age of pulmonary gangrene with pleurisy. No marked lesion was noticed in the brain or spinal cord. Two spheroidal tumours of the size of a mulberry were seen, one on either side, connected with the seventh nerves, just before their exit from the cerebral cavity. The third, fourth, sixth, and the three nerves of the eighth pair, as well as the hypoglossals and spinal accessory, all had small oval tumours at their roots. Most of the spinal nerves were considerably enlarged, and presented numerous larger and smaller tumours. The nerves and ganglia of the sympathetic were likewise unusually large. The cervical ganglia were nearly double their natural size. The semilunar ganglia each formed a tumour as large as a Spanish nut. The tumours presented the structure of fibroma, but some of them contained large, rather indefinitely described cells, which were believed to be ganglion cells.

In 1843, two very similar cases were treated in the hospital of the House of Industry in Dublin, and form the basis of the very excellent and finely illustrated monograph on the Neuroma by Mr. Smith,¹ of Dublin.

CASE X.—The first patient, John M'C., a cattle driver, who had been constantly exposed to the weather, by day and night, had been admitted to the hospital three years before, with a globular tumour about as large as a medium-sized cocoanut, on the right side of the neck, extending from the mastoid process to within a short distance of the sterno-clavicular articulation. The tumour was freely movable from side to side, but resisted attempts at longitudinal movements. It had existed for fifteen years, but had never been painful, and was now troublesome only in the inconvenience which its size occasioned. A small tumour, of the size of a walnut, was found under the tongue. The tumours were thought to be malignant, and the patient was discharged without operation.

In 1843, he was again admitted, complaining of severe pain in the left hip. A tumour about the size of a man's head was found on the posterior aspect of the left thigh, which had been growing for two years. His general health had greatly depreciated since his last admission; he was restless, without appetite, and sleepless, pulse frequent, respiration normal, no excess of perspiration, and no diarrhoea. He lingered for a few months, gradually wasting away, and died with hectic symptoms and without pain, but emaciated to the last degree. The tumour in the neck was no larger at the time of death than when he first came under observation three years before.

Autopsy.—In the right iliac fossa a tumour was found, three and a half inches long, and one inch in diameter, connected with the anterior crural nerve, several filaments of which were spread out over its surface. The branches of the lumbar plexus were enlarged, some of the cords being three-fourths of an inch in diameter, and its branches were studded with tumours of various sizes, from that of an almond down. The left lower extremity presented a similar condition. Large tumours were found connected with both sciatics, that on the right measuring five by three and a half inches, that on the left ten by eleven inches. More than 550 tumours were counted on the lower extremities. A similar condition was found in the upper extremities, numerous tumours being present, not only on the larger trunks, but on the minute branches also. Numerous small tumours, from the size of a hempseed to that of a walnut, were found on the lingual, and three or four small tumours on the phrenics in the vicinity of the pericardium. The intercostals on both sides were greatly enlarged, but presented few distinct tumours. No marked alteration was noticed in the brain or spinal cord or their membranes, nor did the enlargement of the nerves in any case extend within the spinal canal. The total number of tumours removed from the body was more than 800.

Microscopical examination showed the tumours to be fibromata, developed in some cases from the intra-fascicular connective tissue, in others, apparently from the lamellar sheath.

¹ The Neuroma. Robert W. Smith, Dublin, 1849.

CASE XI.—Dr. Smith's second case, Michael L., age 32, farmer, was admitted a few weeks after the death of the last case, presenting the symptoms of gastro-enteritis. Patient had always been healthy until a year before admission, when he contracted a severe cold and suffered much from pain in the limbs. He became emaciated, and the functions of the digestive system began to be deranged. On examination, subcutaneous tumours of various sizes were found on different parts of the body. One of these, of the size of a swan's egg, was situated between the tuber ischii and the trochanter major of the left side, and pressure upon this caused a sensation of pain in the leg, and produced a temporary contraction in certain fascicles of the gluteus maximus muscle, throwing them into prominent relief. The appearance of this tumour was said to have been preceded for six months by a sensation of the trickling of cold water down the limb. Six months before admission he first noticed the tumour, when it had the size of a gooseberry. He had suffered no injury at that point. Some of the other tumours were painful when pressed upon. Sensation and temperature of the surface were normal. He had no pain along the spine, but complained of a sensation of trickling cold, proceeding from the angle of each scapula, meeting at the spine, and passing down the back, dividing again at the sacrum, to follow the course of each sciatic. Latterly, his sleep had been broken, he lost flesh, stomach was irritable, food being frequently ejected shortly after eating, skin hot and dry, pulse 106. He died ten days after admission.

Autopsy.—Body greatly emaciated. Over 200 small subcutaneous tumours were scattered over the front and sides of the chest and abdomen. A considerable number was also found on the back. The branches of the right sacral plexus were much enlarged, and connected with them and nearly filling the true pelvis, was a tumour six by five inches, which compressed the rectum and bladder and contained numerous cysts filled with an albuminous fluid. The right sciatic throughout the greater part of its course was one and a half to two inches in diameter, and was composed of an agglomeration of oval or elliptical tumours. Tumours of various sizes were found on all the nerves of the right lower extremity, the total number being over 450. On the left side neither the lumbar plexus nor its pelvic branches was abnormal. The sciatic of this side was three-fourths to one-half an inch in diameter, and on its posterior surface just below its exit from the pelvis was a tumour five by four inches in diameter. The other nerves of this leg were studded with tumours, the whole number being over 300. In both upper extremities more than 300 tumours of various sizes were found. The pneumogastrics commenced to enlarge shortly before entering the chest, and throughout the whole thoracic portion formed trunks of immense size. On the superior portion of the right pneumogastric, which about equalled a goose-quill in size, was a tumour three-fourths by two and a half inches in diameter. Sixty tumours were found on the pneumogastrics and their communicating branches. The phrenic nerves were nearly twice their natural size, and presented near the pericardium a series of oblong tumours, somewhat larger than a grain of wheat. The supra-orbital nerve was enlarged. Nothing abnormal was discovered in the brain or cord. The mucous membrane of the stomach presented the usual characters of chronic inflammation. More than 1400 tumours of the nerves were removed, and Dr. Smith thinks that if all were counted, the number would exceed 2000.

CASE XII.—Dr. Smith¹ mentions the case of an individual, then living, related to him by Dr. Henry Kennedy, which is probably to be classed with the disease we are considering. The patient, a gentleman, forty years of age, has had for sixteen years several small tumours on the legs and arms, which have never been in the slightest degree painful. They are hard and movable transversely but not longitudinally. They have gradually increased in number, there being now about 60 in all. As the new tumours appear, the patient is irritable, and experiences an ill-defined "peculiar" sensation in the part.

CASES XIII. and XIV.—At the sessions of the Academy of Sciences, in Paris, of April 3, 1843, Serres² described two cases of this disease. The first he had

¹ Smith, loc. cit.

² Serres, *Comptes rendus de l'Académie des Sciences*, vol. xvi. p. 643.

seen in 1829, the second shortly before his report. Both died of typhoid fever, and without any symptoms pointing to disease of the nerves. The anatomical changes were similar in both. Most of the cerebro-spinal nerves were thickened, and presented, all along their course, numerous ovoidal tumours of various sizes; these were most marked in the lumbar and sacral plexuses, in the great sciatics, and the pneumogastrics. In one case the sciatics were as large as an adult humerus and very nodular, while the pneumogastrics were twice the size of the normal sciatic, and beset with large tumours. Numerous tumours existed along the cords of the sympathetic, and many of the ganglia were greatly enlarged. In the case of 1829, more than 500 tumours were found along the nerves. In both cases the spinal cord was normal. The roots of the spinal nerves were, in most cases, normal, but a few of both the anterior and posterior were slightly enlarged. As soon, however, as the nerves had passed beyond the ganglia they became enlarged and presented tumours. In one case the intercostal grooves were considerably broader and deeper than normal for the lodgment of the greatly enlarged and nodular intercostal nerves.

CASE XV.—At the session of November 24, 1845, Serres¹ reported to the Academy another case observed by Maher and Payen.

The patient was a convict, twenty-six years of age. He had always been well, and was of a happy disposition. After his sentence, in March, 1845, he became sad and gloomy, his appetite failed, and he had an attack of diarrhoea which lasted fourteen days; he complained also of a sense of weariness in his legs on exertion and of stiffness of the knees. He recovered from his diarrhoea and appeared better, but, receiving at this time a mental shock, he relapsed, his strength diminished, he slept poorly, became apathetic and averse to exertion, and finally quite feeble; the diarrhoea returned, he rapidly emaciated, grew more and more despondent, and died with symptoms of typhoid fever. Muscular movements, although made with aversion, were at all times complete and regular, and there was no absence of general sensibility. He presented no sign of actual pain, and no symptoms were observed pointing to lesion of the nerves.

Autopsy.—Brain and spinal cord normal, with the exception of a slight injection of the pia mater cerebri. Tumours were found in all the cerebral nerves except the auditory, olfactory, and pathetic. The pneumogastrics were enlarged throughout almost their entire course, and presented tumours of various sizes in all their branches. Some of the roots of the spinal nerves were slightly enlarged, but presented no distinct tumours. Beyond the ganglia, however, tumours of various sizes were found throughout their whole extent, in the trunk and extremities, except in the feet and hands, which were entirely free.

CASE XVI.—Gunsberg² describes the case of a man, who presented at first the symptoms of very intense general rheumatism with immobility of the members. After several days of treatment, mobility was at first partially re-established, but difficulty of movement remained in the inferior extremities, and continued to augment during the following weeks until death, when there was complete immobility. In the last days he had incontinence of urine and feces. At the autopsy tumours were found on the third and fourth sacral nerves on both sides of the cauda equina. One tumour on the left side measured 1 by 1.5 cm. The structure was that of fibroma.

CASE XVII.—Serres presented the clinical history of still another case, then living, at the session of the Academy, in May, 1846.³

Age 26, carpenter, had always been healthy; his antecedents were good, no venereal history. In April, 1845, after a day of hard work, and without premonitory symptoms, he became totally blind in the right eye, waking in the morning with vision lost and with ptosis palpebræ on the corresponding side. From this condition he had not recovered at the time of the report. In the same year he had an attack of pleurisy. In January, 1846, without premonition, while in the street, he suddenly felt a convulsive movement in the right thumb, accompanied by pain; the fingers of the same hand became flexed, the pain extended along the arm to the larynx, producing a sense of suffocation, and he was unable

¹ Serres, *Ibid.*, vol. xxi. p. 1171.

² Gunsberg, *Ibid.*, vol. xvii. p. 982.

³ Serres, *Comptes rendus de l'Académie des Sciences*, vol. xxii. p. 879.

to cry out. These phenomena occurred within the space of one-half a minute, and he then lost consciousness. He soon recovered from this attack, but had another the same evening, which, however, was less severe; he had pain in the arm and flexure of the fingers, but did not lose consciousness. The next day he felt well, but the right arm was weak. Since this time he has had several more or less violent convulsive attacks similar to those described. He has become feeble and has considerable pain, especially in the arms and legs. Numerous hard spheroidal or ovoid tumours of various sizes were found in different parts of the body, some of them extremely painful on pressure, others quite insensitive. They are nearly symmetrical on the opposite sides of the body. His general health is fair, but he is emaciated; pulse and respiration normal; intelligence unimpaired.

CASE XVIII.—M. Morel-Lavallée¹ presented to the Surgical Society of Paris, at the session of April 18, 1849, a neuroma of the left median nerve, about the size of a turkey's egg, which had existed for a long time, with the following brief report. It had been painful for about four years, was somewhat movable, and had caused considerable weakness in the fingers of the corresponding hand. Some of the fibres ran over the surface of the tumour and entered it. All the cerebro-spinal nerves presented ganglioniform enlargements of various sizes. Both pneumogastries presented tumours as large as a walnut; there was, however, no disturbance of the respiratory or digestive functions. The brain and spinal cord, as well as the sympathetic, were normal; the patient died of cholera.

CASE XIX.—At the same session of the Society, M. Giraldes mentioned the case of a person dying in a Parisian hospital (of what disease he did not state), who, during life, gave no symptoms pointing to disease of the nerves. All the nerves, however, were found beset with tumours, those on the pneumogastries being as large as two fingers. Some of the nerve fibres passed over the surface, others entered the tumours.

CASE XX.—Lebert,² in 1853, records a case related to him by Dr. Sangalli, of Milan. A female, thirty-five years of age, presenting gibbosity of the spine, began to be subject to epileptiform convulsions at twenty-eight years of age. On her admission to hospital, a tumour of the size of a fetal head (?) was found in the right inguinal region. Two other tumours of the size of a lemon were situated superficially in the left scapular region. She experienced no pain, either in or about the tumours. She died suddenly.

Autopsy.—Cysticercus in brain. The scapular tumours were fibrous in texture; with nerve filaments passing over the surface or entering the tumours at the ends. The inguinal tumour extended into the pelvis, and was surrounded by a chaplet of smaller tumours. The nerves in the extremities were not examined.

M. Houels,³ in the same year, describes the following case, which was treated in Nélaton's clinic.

CASE XXI.—Adrien B., age 26, shoemaker, admitted March 27, 1851, for operation on a tumour in the right groin. Five months before entrance to hospital, he noticed, for the first time, a swelling as large as a pigeon's egg in this region. It caused him slight pain, especially during changes in the weather. Several tumours as large as a grain of wheat were found in the abdominal walls, others in various parts of the body. Most of them gave him no spontaneous pain, and but slight pain on pressure. They were not adherent to the skin. His general condition was good, though he was somewhat emaciated. Certain muscles, especially those of the forearm, were slightly contracted. General sensibility intact. On April 1st, the tumour in the groin was removed; the healing of the wound was slow, not being completed until July; and during this time the other tumours were observed to increase in size. The muscular contraction now became more pronounced; patient complained of pain, especially on changes in the weather. He became still more emaciated; appetite good, respiration normal. Contraction of muscles increased, and movements became slow and embarrassed. General

¹ Morel-Lavallée, *Bul. de la Soc. de Chirurgie*, t. i. p. 225-6.

² Lebert, *Rapport sur le travail de M. Houels, intitulé Du Névrome*, *Mém. de la Soc. de Chirurgie de Paris*, t. iiii.

³ Houels, *Mémoire sur les Névrome*, *Mem. de la Soc. de Chirurgie de Paris*, p. 53, t. iiii

sensibility intact, or seemed even to be a little exaggerated. Toward the end of September patient took finally to the bed; the pains became more acute; did not seem to be localized in the tumours themselves, but were most marked in the forearms and knees. The legs became flexed on the thighs, and finally flexion of the thighs on the body occurred. Passive movements of the legs were still possible, but acutely painful. Later, movements in the superior extremities became impossible, and pressure on the tumours extremely painful; general sensibility still preserved. The number of tumours had now considerably increased. Opium by the mouth and subcutaneously relieved his pain at first, but toward the end was of little avail. In the last days, appetite almost completely failed, diarrhoea came on, respiration became embarrassed, pain more and more acute, slight degree of opisthotonos. Still the general sensibility, and also taste, hearing, and smell, remained intact. A bed sore formed over the sacrum; spontaneous luxation at the left hip joint occurred. Death on December 16th.

Autopsy.—Brain and cord normal, also the viscera. The cranial nerves within the skull voluminous. On the cauda equina numerous small tumours (the largest of the size of a pea) were found along the nerves; on one trunk twenty were counted. With the exception of the olfactory and optic, all the cranial nerves presented tumours of various sizes. The ophthalmic and Gasserian ganglia were very voluminous. Both pneumogastrics above the stomach presented numerous tumours, but on arriving at this point became normal. All the nerves of the upper extremities were notably hypertrophied and, with the exception of those in the palmar regions, were beset with tumours; one of these on the median and another on the radial were as large as a hen's egg. The lumbar and sacral plexuses were greatly hypertrophied, and presented numerous tumours, as did the smaller nerves of the leg, with the exception of those in the foot. There was general hypertrophy of the main trunks of the sympathetic in their cervical and thoracic portions, but no circumscribed swellings; in the abdominal portion they were nearly normal. The great splanchnic was voluminous, and presented small circumscribed swellings. Semilunar ganglion and its plexuses normal. Mesenteric plexus presents a few small tumours, the largest of the size of a hazel-nut. Structure of the tumours fibromatous.

CASE XXII.—Kupferberg¹ describes the case of a man sixty years of age, in whom six years after fracture of the right leg and without any special local symptoms, numerous tumours were developed. They were most numerous on the broken leg, but were found in the other leg and in the perineum, also in the right infra-clavicular fossa and near the right acromion. At the autopsy numerous tumours were found within the spinal canal attached to the cords of the cauda equina. They existed on the muscular as well as the subcutaneous nerves. There was fatty degeneration of the muscles as well as of the nerve fibres. Structure of the tumours, fibroma and fibro-myxoma.

CASE XXIII.—Follin² mentions briefly, and without a clinical history, a case in which there were innumerable tumours scattered over the nerves, each of the filaments of the sciatics presenting several distinct nodules.

Temoin,³ in 1857, recorded the following case:—

CASE XXIV.—Male, age 32, health good until fifteen years of age, when he remarked an insensitive tumour, of the size of a hazel-nut in the right submaxillary region, which seemed to be increasing in size. At this time he had violent toothache, which continued notwithstanding the extraction of several sound teeth. When sixteen or seventeen years old he observed tumours on the left arm, then on the left thigh, and on the fingers of the right hand, and finally in nearly all parts of the body. While small the tumours were not painful; when larger, pressure caused pain and momentary paralysis in the part. When twenty-four years old he had articular rheumatism, lasting five months. In his thirty-second year, considerably emaciated, he was admitted to hospital, and the tumours, which had not increased in size for some time, were most abundant on the breast, back, and

¹ Kupferberg, Beiträge zur Geschwulste im Verlaufe der Nerven. Mainz, 1854.

² Follin, *Traité élémentaire de Pathologie*, 1861, vol. ii. p. 218.

³ Temoin, *Bul. de la Soc. anatomique*, Dec. 1857.

arms. Pressure on some of those situated on the lateral walls of the chest, and on one about the size of a hen's egg, at the superior angle of the left scapula, caused pain and produced an uncomfortable sensation in the chest, and embarrassed respiration. The submaxillary tumour was spontaneously painful. There was no paralysis, no disturbance of function in the organs of sense, and his intelligence was intact. On the 7th of June, 1857, one of the tumours on the left radial was removed; a painful inflamed ulcer remained at the seat of operation, and the patient died on the 12th of July, of "purulent infection."

Autopsy.—Two metastatic abscesses in the liver. Brain, spinal cord, and cerebral nerves normal. The intercostal, as well as most of the other spinal nerves, especially toward their central end, were thickly beset with tumours. In the periphery the tumours were fewer in number. Both pneumogastrics, especially in the cervical region, presented a great number of tumours, many of them about the size of a hazel-nut; the pulmonic, cardiac, and visceral plexuses were free. A tumour was found on the cervical sympathetic. The tumours were fibroma, and the nerve fibres within them did not seem to be interrupted, but simply displaced by the new formation.

CASE XXV.—Wilks¹ presented to the London Pathological Society, in Nov. 1858, specimens of neuroma from a woman twenty-five years of age, of dissolute habits, but with no definite syphilitic history, and who, while in hospital, presented no symptoms of disease of the nervous system, but was treated for and died of phthisis pulmonalis. Tumours of the nerves were accidentally discovered when the subject came to be used for anatomical purposes. The cranial nerves were not examined, except the vagi and phrenics, the former of which was somewhat affected. Tumours of the nerves of various sizes, the largest on the sciatic, being as large as a pigeon's egg, were found in all parts of the body, as well as diffuse indurations. They had the structure of fibroma.

CASE XXVI.—The details of a case reported by Klob in the *Zeitschrift der Gesellschaft der Wiener Aertzte*, 1858, No. 13, p. 47, the writer has been unable to obtain.

CASE XXVII.—Another case was presented to the London Pathological Society, in 1861, by T. Smith.² Twelve neuromata were removed after death from a woman between sixty and seventy years of age. They were found on the internal cutaneous and posterior interosseous nerves of the arm, and varied in size from No. 6 shot to a walnut; the larger ones having existed for more than forty years. Their structure was that of fibroma.

CASE XXVIII.—The following is a summary of a case described by Heller,³ in 1865. J. F., male, age 45, teacher. In 1847 he was treated in a hospital for periostitis calcis dextra. Later, ulcers appeared on the leg of the same side, which, without much pain, increased in size, and finally became so extensive and troublesome that amputation was advised. This patient refused, and, though with intervals of improvement, his condition became worse and worse, until finally, in December, 1865, unable to use the legs and hobbling on crutches, he entered the hospital with a purulent, stinking ulcer covering nearly the entire lower part of the right leg and foot, and with four toes gangrenous. On December 18 the leg was amputated in the upper third. When patient came out of the chloroform narcosis, the author noticed a remarkable indifference to the pain of dressing the stump, although attention had not been before called to any lack of sensibility in the part. He died of pneumonia two days after the operation.

Autopsy.—Faulty development of external genitals—cryptorchismus. Pneumonia of right side. Nothing abnormal in brain or upper portion of spinal cord. From the second lumbar, all the roots of the spinal nerves were enlarged, forming, partly within and partly without the spinal canal, a succession of thick, knobby, fusiform masses. A tumour of the size of a hazel-nut was found within the dura, on the third and fourth left lumbar nerves, and also a number of such tumours on the nerves of the cauda equina. No tumours were found in the upper half of the body. In both thighs there were numerous fusiform tumours, both subcuta-

¹ Wilks, *Trans. Path. Soc., London*, vol. x. p. 1.

² Smith, *Ibid.*, vol. xii. p. 1.

³ Heller, *Virchow's Archiv*, vol. xlv. p. 338.

neous and muscular; one lying beneath the left sartorius measured 4.5 by 10 cm. The muscles in the upper part of the body were normal, but those in the lower part, especially in the left leg, presented the most extensive fatty degeneration, having entirely lost their natural color, and being converted into pure yellow masses. A part of the sympathetic ganglia was enlarged, forming dense fusiform masses, some of them measuring 2 by 4 cm. The author thinks, that, in addition to the increase in connective tissue which made up the bulk of the tumours, there was an actual proliferation of nerve fibres.

Hitchcock¹ gave an account, in 1862, of three cases, all belonging to one family.

CASE XXIX.—Mrs. C., age 81. No family history of importance, her parents had no tumours of any kind; she is healthy, and her mental powers are unimpaired. When thirty years of age tumours began to appear beneath the skin in different parts of the body. They gradually increased in number, and some of them in size. They have never been painful, except from injury, and the color of the skin over them remains unchanged. They are now spread over the entire surface of the body, being most abundant in the neck, thorax, and arms. They vary in size from a pin's head to a walnut. Some of them are hard, others soft, and present various forms. She has had seven children, several of whom died early of acute diseases. Samuel and Elizabeth both have tumours like the mother.

CASE XXX.—Elizabeth C., age 54. Tumours began to appear at ten years of age. One in the clavicular region, as large as a hen's egg, was removed when she was twenty-one years of age. Another was also removed from the lip. She thinks the rest have grown more rapidly since these operations, and she now has several on different parts of the body.

CASE XXXI.—Samuel C., age 46. When twenty-five years of age he first noticed a small movable tumour just above the inner condyle of the humerus; this slowly increased in size for twenty years, being painful only on strong pressure. Two years ago it began to increase rapidly in size, and now, on pressure, or when the arm is violently used, the tumour is painful, or a numbness, or a prickling sensation, or acute pain extends down to the fingers. On admission to hospital, the tumour measured six and a half by three and a half inches. It was removed, being found attached to the ulnar nerve, some of whose fibres ran over its surface. The nerve was severed in the operation. Other subcutaneous tumours were noticed at the time of the operation. The wound healed well, leaving paralysis of the parts supplied by the severed nerve. Eight months after, another tumour appeared at the seat of operation, which was very painful, and increased rapidly in size, encircling the limb so that in one year the arm had a circumference of twenty inches. The other tumours had, in the mean time, increased in size and number. They were, for the most part, soft, some of them pedunculated, the largest of the size of a pea, and were chiefly found on the back, chest, and belly. A painful, cord-like mass was felt in the axilla, extending down toward the large tumour of the arm. Exarticulation at the shoulder-joint was now performed, and a dissection of the arm revealed numerous tumours along the nerves. The wound did not heal well, but continued unhealthy, raw, and bleeding. Patient lost flesh, and died from exhaustion seven months after the operation. No autopsy was made.

CASE XXXII.—In Heusinger's case,² described in 1863, the lesion of the nerves was coexistent with tuberculosis. The patient, 23 years of age, a tailor, was weakly built but healthy in early youth, and mentally sound. Began to cough and emaciate a year before death. On admission, he was extremely weak, had severe cough, sweat profusely, and had diarrhoea. In the intercostal spaces, and over the entire surface of the body, especially along the course of the large vessels and nerves, tumours were found, from the size of a hemp-seed to that of a bean. They were not attached to the skin, but gave to the latter, in many parts, a beaded appearance. They had scarcely attracted his attention, and had given him no annoyance. They were regarded as degenerated lymph glands and vessels, associated with his condition of general tuberculosis. He grew rapidly

¹ Hitchcock, *Am. Jour. Med. Sciences*, vol. xliii. p. 320.

² Heusinger, *Virchow's Archiv*, Bd. xxvii. p. 206.

weaker, and died, with symptoms of pulmonary œdema, soon after admission, having had no local pain.

Autopsy.—Lungs infiltrated with gray and yellow tubercles, no large cavities. Brain normal; cord not examined. Tumours were found on several of the cerebral nerves soon after their emergence from the bony canals. One as large as a pigeon's egg was found on one of the hypoglossal nerves. Both pneumogastrics were as thick as the finger, as were some of the trunks of the brachial plexus. The great sciatics, on emerging from the pelvis were two centimetres in diameter. The mesenteric nerves were studded with tumours, and looked like strings of pearls. The lesion was especially marked in the sympathetic. The protocol says, "Right and left from the vertebral column lies on either side a cord as large as the thumb, pouched like a large intestine, and sending off beaded cords to the organs, heart, chest-wall, etc." Beneath the diaphragm the cords were also beaded with tumours, from the size of a hempseed to that of a hazel-nut. On microscopical examination, the nerves within the tumours, which were fibromata, seemed to be normal.

CASE XXXIII.—Leboucy¹ records a case, without clinical history, in which there was a most extensive formation of tumours. They presented the usual variety in form and size, and were found in various branches of the third and fifth pair, in the pneumogastrics, and their laryngeal, pulmonic, œsophageal, and cardiac plexuses. The phrenics presented numerous nodules before passing through the diaphragm. The intercostal nerves were greatly enlarged and nodulated. One of the tumours on the median measured three by four inches.

CASE XXXIV.—Another extremely interesting case is that of Sibley.² Patient aged 45, coach painter. Had always enjoyed good health until seven years before death, when he began to feel himself growing feeble, but he had no more definite symptoms until four years before death, when the use of the lower extremities became impaired, and by degrees he lost all power of movement. A sloughing sore appeared on the back, and, when admitted to the Middlesex Hospital, he had no power of movement in the muscles of the lower half of the body, and the legs were drawn up to the abdomen; they could be drawn down, but would again soon become flexed. He retained some power of movement in the upper extremities, being able to feed himself if the food was cut for him. Cutaneous sensibility was entirely lost in the lower extremities, but a certain amount of sensibility remained in the hands. Urine and feces passed involuntarily. A large tumour was evident near left elbow, and another below Poupart's ligament of the left side. Appetite good. There was at first some improvement in the sloughing sore on the back, but it soon became worse, and patient died one month after admission.

Autopsy.—Body well nourished. No lesions of thoracic or abdominal viscera. Brain and cranial nerves normal. In the spinal canal numerous tumours were found within the membranes connected with the roots of the nerves, being most abundant in the cervical and lumbar regions. In the cervical region several tumours were found, the largest having the size of a large walnut, and pressing on the cord constricted and softened it. The large tumour noticed during life near Poupart's ligament was attached to the anterior crural, and contained several cysts. The tumours were fibromata.

CASE XXXV.—Generisch,³ in 1870, gave an admirable account of a most interesting case. Karl P., age 22, shoemaker. His mother died of carcinoma mammae. She had numerous tumours in the axilla, along the ribs, in the precordial region, and in the muscles. (These, at the time of her death, were supposed to be enlarged or cancerous lymph-glands, but in view of the history of her sons, and their situation, it is not improbable that at least a part of them were neuromata.) Patient had never previously had a severe illness. Early in 1818, after exposure to severe cold, he began to experience acute pain in the ball of the left foot, which was renewed at every change in the weather. This pain finally became so acute that he sought admittance to the hospital. He was of

¹ Leboucy, Des Nevromes, Paris, 1863.

² Sibley, Med. Chir. Transactions, vol. xlix. p. 39, 1866.

³ Generisch, Virchow's Archiv, Bd. xlix. p. 15.

medium size, looked like a malarial patient, lips pale and bluish, conjunctivæ and mucous membrane of mouth singularly colorless. He was an epispadias, and his voice was like that of a child. Numerous larger and smaller resistant fusiform tumours were found scattered over the entire surface of the body, the skin over them being normal. Some of them were spontaneously painful, others, especially the smaller ones just beneath the skin, became so on pressure. Those of the size of a hazel-nut, or larger, also those lying deeper, were either not at all painful on pressure, or only when considerable force was used. He said that he first noticed them when eight years old. They gradually enlarged and increased in number, some of them being as large as a pigeon's egg.

An examination of the blood revealed an increase in the relative number of the white blood cells. Neither the higher senses, nor the sense of touch, nor perception of heat, nor muscular power, were in the least degree impaired. Respiration and heart functions normal. About ten weeks before death he began to have intense pressing, stretching pain in the right buttock, which increased in severity. A rapidly growing tumour was discovered here which at the time of death had a diameter of 3.5 cm. In the mean time he began to have pain in the right foot, and presently took to the bed. The right foot and leg now became slightly anæsthetic, and assumed a position resembling talipes equinus; and extensive œdema occurred, extending up to the middle of the thigh. Temperature ranged from 38.5° to 39.7° C.; pulse frequent and soft. A persistent diarrhœa now set in. A very painful digital examination of the rectum showed that the gut was pressed upon by a firm rough tumour within the pelvis on the right side. Later, micturition became difficult; urine scanty, cloudy, with reddish sediment, and on several occasions contained albumen. The painful and sometimes bloody diarrhœa was not controlled permanently by the most powerful remedies. A bed-sore formed over the right trochanter. During the last days he several times experienced a sensation of coldness, but had no pronounced chill. He died suddenly of pneumothorax.

Autopsy.—In the lungs were scattered areas of broncho-pneumonia and small cavities connected with the smaller enlarged bronchi, through the walls of one of which the perforation had occurred. On the surface of both lungs numerous wedge-shaped, soft, whitish nodules were seen, as large as a hazel-nut, with the broad end outward. Plugs were found in some of the smaller arteries in the lung tissue. A few scattered neuroma were found along the bronchi. Brain and cranial nerves within the skull normal. The roots of the ciliary ganglion and the ganglion itself were thickened and unusually resistant. Small tumours were found on the oculomotorius, right trochlearis, and on several branches of the trigeminus. The spinal cord was normal, but the spinal nerves outside the dura were much enlarged as they passed through the greatly widened intervertebral foramina, the change being most marked in the cervical and lumbar regions. The whole spinal canal was enlarged especially in the lower lumbar and sacral regions, having in the latter portion a diameter of more than 3.5 cm. Tumours of varying size were found in all the spinal nerves. The phrenics were beset with tumours of the size of a barleycorn. Both vagi were considerably enlarged and knobbed, and in some parts of the thoracic portion measured 9–12 mm. in diameter; upon and below the diaphragm were numerous tumours as large as a pea. Tumours were also found in the various plexuses. The sympathetic nerves were thickened and the ganglia enlarged. Both splanchnics and the intercostals present tumours, those of the latter nerve projecting through between the ribs into the pleural cavity. Several tumours were found in the subserosa of the stomach, in the porta hepatis, and were very abundantly distributed in the mesentery, the largest having the size of a pea. The true pelvis was filled with large subserous tumours, and such were also found in both iliac fossæ. Tumours of the size of a hen's egg were situated on the branches of the lumbar plexus, some of them containing cheesy masses, others completely calcified. The sciatics were enormously enlarged. The microscopical examination showed the tumours to be essentially fibromata, but some were distinctly sarcomatous, others myxomatous. The wedge-shaped masses in the lungs were sarcomatous, and the author regards them as metastatic. The above mentioned plugs in the smaller arteries of the lungs consisted chiefly of spindle-shaped cells somewhat resembling those composing the

wedge-shaped nodules. The nerve fibres could be readily seen passing through the tumours, and the author concluded, after carefully counting the nerve fibres in transverse section before entering and within the tumours, that their number was not increased.

The following case was reported by Vallender¹ and Gerhardt² :—

CASE XXXVI.—Jacob P. (brother of the last case), aged 34, single. First began to talk when seven years old, and stammered excessively. When fifteen years of age he received a blow on the right temple, which was followed by a painful bump. In a few days the pain ceased, but a small hard tumour remained, which gradually increased in size, giving him however no inconvenience. His intelligence was much below the average. On admission to hospital subcutaneous tumours of various sizes were found in different parts of the body. One on the temple measured 5 by 2.3 cm., and one on the right side of the jaw, about as large as a hen's egg, was painful on pressure. Several of the larger tumours were painful on pressure, the smaller ones not. The patient was aware of the existence of the tumours on the forehead and jaw only. The genital organs were normally formed, but the penis was small, and patient had never experienced sexual desire. The higher senses, cutaneous sensibility, and muscular power were unimpaired.

On Sept. 12, 1874, he got thoroughly drenched, and remained several hours in his wet clothes. On the 13th, he had difficulty in swallowing, which increased during the next day. Well-marked tetanus was now developed, from which he died on the 18th.

Autopsy.—Everywhere beneath the skin, and in many muscles, small fusiform tumours were found upon the nerves. Both pneumogastrics and phrenics were beset with numerous fusiform tumours: one on the right pneumogastric, just below the base of the skull, being as large as a goose egg. The spinal cord and the roots of the spinal nerves were normal. The larger vessels of the cerebral pia were distended with blood, the smaller empty through compression. Pia oedematous, with much fluid at the base. In the central ganglia were spots of diffuse redness. On section of the brain, circumscribed resistant nodules were found, most abundant in the right side, and having an average diameter of 1 cm. These were found in the left optic thalamus: on the right nucleus lenticularis and corpus striatum; in the vermis superioris cerebelli; in the cerebellar hemispheres; in the left corpus dentatum, and in both crura cerebelli. The microscopical examination of these nodules was not reported. The tumours of the nerves were fibromata.³

The following is a summary of a case briefly reported by Wegener.⁴

CASE XXXVII.—Patient was seven weeks ill with typhoid fever, during which time complete and persistent deafness occurred. Numerous subcutaneous spheroidal tumours of various sizes up to that of a large hazel-nut were scattered over the body, movable but not painful. With the exception of the deafness, there were no symptoms pointing to disease of the nerves. Patient died in convalescence, from intestinal perforation.

At the *autopsy* numerous tumours were found on the pneumogastrics as they entered the chest. All the spinal nerves presented numerous tumours of varying size, which were especially abundant on the lumbar and brachial plexuses, and on the sciatics; they were also very abundant on the subcutaneous nerves, which in many cases presented a beaded appearance. Tumours were also found on the cervical sympathetic and along the lesser curvature of the stomach, also on the phrenic nerves. The brain and cranial nerves within the skull were normal, as was also the spinal cord. The nerves of the face were not examined.

¹ Vallender, *De tumoribus fibrosis circumscriptis in tela cellulosa subcutanea*. Berlin, 1863.

² Gerhardt, *Archiv für klin. Medicin*. Bd. XXI. p. 276.

³ This case was made the subject of an inaugural dissertation by Dr. Carl Rump, in which the histology of the tumours is described at length, and which is epitomized in *Virchow's Archiv*, Bd. lxxx. p. 177.

⁴ Wegener, *erliner Klin. Wochenschrift*, No. 2, 1870.

The microscopical examination is said to have shown that the tumours were composed of amyelinic nerve-fibres.

The following case was described by Bruns,¹ in 1870.

CASE XXXVIII.—P. M., male; 33 years of age; general health good. He was born with a flat tumour on the left temple and left upper eyelid, which grew with the growth of the body; it was lobulated, irregularly nodulated, hanging in sack-line folds down to the ear covering the eye whose bulbus was atrophied. Knobby cords were felt within the tumour which has given him no special inconvenience. Six years ago he first noticed a tumour on the left side of the neck which was then about as large as a hen's egg, and lay just below the angle of the jaw. It continued to increase in size, and he came for operation. It was now about as large as the double fist, reached from the jaw to the clavicle and forward to the median line, displacing the larynx. It was freely movable sideways, but not up and down. The skin over it was normal. At first he had for a time no subjective symptoms, but two years before admission he began to suffer from a gradually increasing hoarseness which, however, never reached aphonia. During the last six months he had darting pains in the tumour, radiating to the ear and back of the head, as well as difficulty of breathing, which was accompanied by a whistling sound, especially after exercise. Vigorous movement of the tumour or strong pressure on it induced cough. On various other parts of the body hard tumours were found from the size of a barley-corn to that of a walnut, of whose existence he was unaware. An operation was performed for the removal of the tumour of the neck. On cutting down upon it a nerve was seen to enter it from below which proved to be the pneumogastric, and was severed. During the operation violent cough and intense suffocatory symptoms occurred, passing off after the manipulations ceased, when the breathing became normal. Patient did well until the tenth day after the operation when a profuse hemorrhage occurred terminating in death.

Autopsy.—The hemorrhage was occasioned by an ulceration through the wall of the carotid. The left vagus was beset with fusiform and spheroidal tumours from the size of a millet seed to that of a bean, down to its finest visible ramifications. On the right vagus tumours were found as large as a walnut. Tumours were also discovered on numerous other nerves; especially on the brachial plexus, the subcutaneous nerves, and on the sciatics and their branches. Some of these were as large as a pigeon's egg.

A brother of the above patient had a congenital elephantiasis with plexiform neuroma of about the same size and shape and in the same region, and his mother had numerous wart-like tumours in the skin.

CASE XXXIX.—Czerny² records a case somewhat analogous to the last, in which an elephantiasis coexisted with multiple neuroma.

Therese G., age 25. Her great grandmother, grandfather, and mother were the subjects of more or less extensive elephantiasis, the character of this disease in the mother being, in many respects, similar to that in the daughter. Patient was born with a small tumour of the back, which grew rapidly, hanging down over the right buttock to the knee, producing deformity of the spine. The outer and front sides of the right thigh became covered with hard thick skin beneath, and within which a congeries of flattish spheroidal tumours of various sizes formed a thick knobby mass.

Various operations were attempted for the removal of portions of the large tumour, which became ulcerated in several places and undermined by abscesses, but she bore them badly. High fever and chills developed, paralysis of the left leg and partial paralysis of the left hand occurred, and she died of exhaustion.

Autopsy.—Several small abscesses were found beside the middle meningeal arteries, and a thrombus of the middle cerebral. Small abscesses and infarcta were found in the liver, spleen, and kidneys. Aside from the plexiform neuroma in the hypertrophied skin, in the right side of the pelvis and lying on the quadratus lumborum muscle, which was fatty, a great mass of larger and smaller

¹ Bruns, *Virchow's Archiv*, vol. 1. p. 108.

² Czerny, *Archiv für Klin. Chirurgie*, Bd. xvii. p. 357.

tumours, involving the branches of the lumbar plexus, was found. The nerve cords connecting these tumours were greatly thickened, and the tumours and thickening of the nerves extended inward through the intervertebral foramina which were greatly enlarged. One of these tumours 4 by 2.5 cm. in diameter lay within the dura mater, compressing the cauda equina. The sympathetic in the same region was excessively involved, forming a part of the tumour mass.

The branches of the external and middle cutaneous presented beneath and within the thickened skin the usual characters of the plexiform neuroma. Other tumours were found along the leg. They were for the most part composed of connective tissue, although in some cases amyelinic nerve-fibres preponderated. Some contained numerous, very much elongated, cells which the author regarded as immature amyelinic nerves. Ganglion cells were also found in some.

The case reported by Prof. Kosinsky, of Warsaw,¹ in 1874, is in some respects unique, and, if it indeed belongs among the cases we are now considering, of great interest from the therapeutic standpoint:—

CASE XL.—A. B., age 30, soldier. When about sixteen years of age he first noticed several small painless tumours on the right lower extremity. Subsequently when marching they began to grow and become painful. They were over 100 in number, and were scattered over the posterior and outer surface of the thigh to its lower third, and also on the buttock. They were spheroidal or ovoidal, mostly hard, and varied in size from a pin's head to a hazel-nut. The skin in their vicinity was dry, rough, and scaly. Pressure, especially on the larger tumours, caused intense radiating pain. Walking induced pain, but when at rest it passed off. They corresponded to the branches of the lesser sciatic and external cutaneous.

After a trial of various medicaments a portion of the lesser sciatic was excised, and while the wound was healing by suppuration the tumours began to diminish in size, and after four months many of them had entirely disappeared, and the remainder gave him no trouble whatever.

In 1878 Gerhardt² described a new case whose prominent features are the following:—

CASE XLI.—P. R., age 30, day labourer. Father died at 50 of nervous fever. Mother healthy, but occasionally has cramps of the legs. Since early youth he has had numerous hard tumours beneath the skin in various parts of the body which have not been painful, and have not increased in size. After getting wet through while heated, he began to feel pain in the cervical region, and some of the vertebræ became unusually prominent. The left arm and hand grew weak, and subsequently the left lower extremity. He experienced the sensation of a band around the body; had pain in the back, and convulsive movements in the left hand and foot. On admission to the hospital in Würzburg (the fifth Würzburg case), he was well nourished; head held to the left; partial paralysis of the left facialis. Memory and intelligence unimpaired. Atrophy of muscles in the upper extremities, and finer movements of the fingers imperfectly executed. Partial paralysis of both legs, with constant fibrillar and fascicular twitchings in left thigh. Sensibility diminished in both forearms and legs. Numerous tumours evident in various parts of the body, one as large as a hen's egg. Pressure on the sciatics caused severe twitching in the muscles of the thigh. Patient died of typhoid fever, exhausted by profuse bloody diarrhoea.

Autopsy.—The usual lesions of typhoid fever were found. Brain anæmic; nerves of basis intact. Small tumours were found on the oculo-motorius, trochlearis, abducens, and on the branches of the fifth pair and glossopharyngeals. Both pneumogastrics were studded with tumours as large as a bean in the cervical region, and many were found on the thoracic plexuses and along the bronchi far into the lungs and in the larynx.

In the spinal canal, in the cervical region, and in the foramen magnum, small

¹ Kosinsky, *Centralblatt für Chirurgie*, July 18, 1874.

² Gerhardt, *Deutsches Archiv für Klin. Med.*, Bd. xxi. p. 268.

tumours lay upon and compressed the cord and medulla, and the intervertebral foramina in the cervical region were enlarged and filled with tumours and swollen nerves. The brachial and lumbar plexuses were greatly enlarged and covered with tumours, forming large, shapeless, knobby masses. The left sciatic was so large that it could hardly be surrounded by the fingers of one hand, and the right was about two-thirds as large. The flattened fusiform tumours on some of the subcutaneous nerves of the thigh were so abundant as almost to conceal the muscles beneath. In the sympathetic also the lesion was extensive, especially in the superior thoracic region. At the origin of the aorta and pulmonary artery, a large compound tumour quite surrounded the vessels, and had produced considerable erosion of the vertebræ beneath. Various branches of the sympathetic in the abdomen and pelvis were thickened and beset with tumours. In front of the left kidney lay a tumour one-fourth larger than the organ itself, connected above with the solar plexus. At the porta hepatis lay numerous masses of tumours, and some were found along the arteries within the organ, even out to the finer ramifications. The mesentery was studded with small tumours; many were scattered over the surface of the intestines; several lay along the seminal vesicles and beside the pancreas.

With the hope of establishing some other means of definite diagnosis than extirpation, Gerhardt made some interesting observations on his patient with the galvano-puncture. Selecting a tumour on the outer side of the rectus femoris, which seemed to belong to the cruralis, a fine needle connected with the cathode was carried into it, while the anode by means of a moistened sponge was put in connection with the skin over the patella. By the use of five elements only, contractions were produced in the vastus externus, while by cutaneous galvanization alone, twitching was first produced by the use of twenty-five elements. A few days later the experiment was repeated, when eight elements were necessary to produce the contractions. When the needle was stuck into a small superficial tumour of the cutaneous nerves, after a short time, pain regularly occurred, followed by strong reflex spasm of the whole extremity. In view of these results, the author suggests the possibility of a physiological diagnosis of the neuroma.

If now we make a brief analysis of these records, we find that in the 32 cases in which the sex is recorded, 24 were males, 8 females. The average age at the time of death is 34. The duration of the disease it is difficult to determine, on account of the entire absence of symptoms, which many of the cases present in their early stages; but in some, the tumours were observed at a very early age, and in others they were unquestionably congenital. The association of the specific nerve lesion with neuroses and malformations is worthy of remark. Two cases were cretins, one an idiot; two are recorded as of weak intellect; one was a cryptorchis; in one the penis was small, and there was entire absence of sexual proclivity; in one there was an inconsiderable irregularity in the lobulation of the lungs; one was an epispadias. In two the lesion was associated with elephantiasis. The clinical history is most remarkable in the variety and lack of uniformity of the symptoms, and the marked discrepancy between these and the anatomical lesion in many of the cases. In the 26 cases in which a fairly complete account of the symptoms is preserved, 12 presented no symptoms whatever pointing to a lesion in the nervous system. In the remaining 14, a greater or less degree of paralysis was present in 8; more or less pain was experienced in 13, and this of the most varied character; sometimes spontaneous, sometimes occurring only on pressure on the tumours, and in some cases influenced by atmospheric changes. Dimi-

nition in cutaneous sensibility was observed in 4 cases; convulsive movements in 4; abnormality in respiration in 4; palpitation in 1. Headache was a prominent symptom in 2 cases, in one of which there were brain lesions. Leucocythosis was observed in 2 cases; alteration of the muscles in 3. Diarrhœa occurred toward the end of life in 6 cases, contributing to, or inducing the condition of weakness and debility in which many of the cases died. Among the immediate causes of death we have: typhoid fever, 5; cerebral apoplexy, 1; gastro-enteritis, 1; cholera, 1; phthisis pulmonalis, 3 (one with tubercle); pulmonary gangrene with pleurisy, 1; pneumothorax, 1; pneumonia, 2; tetanus, 1; hemorrhage, 1; pyæmia, 1; and the remaining cases terminated, for the most part, in general debility and exhaustion, some with hectic, others with diarrhœa. Tumours in the brain were found in 2 cases; within the spinal canal in 4. They were found in most of the peripheral nerves in 27 cases, and were confined to special groups of nerves in 10. The sympathetic was affected in 14 cases. The pneumogastriacs were affected to a greater or less degree, sometimes excessively so, in 17 cases; only 3 of these, however, presented abnormalities in respiration, and 1 of them suffered from palpitation. (The remaining case in which affection of the respiratory movement occurred was living at the time of the report.)

Further, the subjects of this disease, so far as the records show, as a rule, bear operative interference badly; in some cases the remaining tumours having grown more rapidly after operation; in others the wounds healed slowly; in some, the patients dying from exhaustion, and in one from pyæmia. In regard to the remarkably frequent occurrence of typhoid fever in these cases, little more can be said at present, than that it is, at least, a dangerous complication. It may be further noted that the special senses are usually unaffected, but there are exceptions. The lesion of the nerves does not, in most cases extend into the hands and feet.

So far as the diagnosis is concerned, it will be seen, from the above analysis, that it is at best uncertain and difficult. Pain, which is so frequent an accompaniment of the single neuroma, is here frequently entirely absent, and when it does occur is often not definitely localized. There may also be the most perfect control of muscular movement while enormous changes have occurred in both central and peripheral nerve trunks. Numerous hard or soft tumours, in different parts of the body, arranged along the course of the nerve trunks, ovoidal or fusiform in shape, not attached to the skin, and movable transversely, but not longitudinally, whether painful or not, may justly give rise to a suspicion of the existence of this disease; and the galvano-puncture, as a possible means of diagnosis (Gerhardt, *loc. cit.*), is to be borne in mind.

A consideration of the propriety of employing the term neuroma, for tumours which, in the majority of cases, do not apparently contain new-formed nerve-tissue, would carry the writer beyond the scope which he has assigned to the present paper.

THE AMERICAN JOURNAL OF THE MEDICAL SCIENCES.

Edited by I. MINIS HAYS, M. D. Subscription price, (per annum) \$5.00.

Is published *Quarterly*, on the 1st of January, April, July and October. Each number contains about 300 large octavo pages. This Journal has now been issued for over fifty years, and during this long period it has maintained its position in the highest rank of Medical periodicals, both at home and abroad.

THE MEDICAL NEWS AND ABSTRACT. Edited by I. MINIS HAYS, M. D. Subscription price in advance, (per annum) \$2.50.

Is issued monthly, commencing with January 1st, 1880, being a consolidation of the two well-known journals "THE MEDICAL NEWS AND LIBRARY" and "THE MONTHLY ABSTRACT OF MEDICAL SCIENCE."

The "NEWS AND ABSTRACT" consists of sixty-four octavo pages, in a neat cover. It contains a CLINICAL DEPARTMENT, in which will be continued the series of ORIGINAL CLINICAL LECTURES, by gentlemen of the highest reputation throughout the United States, together with a choice selection of foreign Lectures and Hospital Notes and Gleanings. Then follows the MONTHLY ABSTRACT, systematically arranged and classified, and presenting five or six hundred articles yearly; and each number will conclude with a NEWS DEPARTMENT, giving current professional intelligence, domestic and foreign, the whole fully indexed at the close of each volume, rendering it of permanent value for reference.

PREMIUM FOR ADVANCE PAYMENT.

Subscribers paying \$5.00 in advance will receive both the American Journal of the Medical Sciences and the Medical News and Abstract free of postage for one year.

THE OBSTETRICAL JOURNAL OF GREAT BRITAIN AND IRELAND. Published monthly, each number containing 64 octavo pages. \$3.00 per annum in advance. Single copies, 25 cents.

The subscriber will thus obtain for this trifling sum more than 750 pages per annum, containing an extent and variety of valuable information which it would be difficult to obtain elsewhere.

Remittances can be made by Bank Draft, P. O. Money Order, or Registered letter at the risk of the undersigned,

HENRY C. LEA'S SON & Co., PHILADELPHIA, PA.
